Claims

1. A system for viewing of a section of a medium which receives and returns light both from the section, and from sites adjacent to the section that reduces the quality of an image formed from said return light, said system comprising a polarization separator and a polarization retarder, which are disposed successively in the path of the light received by the medium, for processing the light said medium receives into light which is polarized generally circularly in opposite senses and is incident on said medium at spots spaced laterally from each other, thereby providing interference of light returned from said sites and enabling construction of said image in response to a polarization parameter of said return light.

2. The system of Claim 1 wherein means are provided for focussing said light processed by said polarization separator and said rotator into foci at said spots.

3. The system of Claim 1 wherein said polarization parameter is the degree of rotation of the polarization of said return light from said spots.

4. The system of Claim 1 wherein said polarization parameter is a function of the differential circular dichroism or optical activity of the light returned from said spots.

5. The system of Claim 2 wherein said spots are partially overlapping.

6. The system of Claim 5 wherein said focusing means providing said spots is an objective optic and said separation of said foci is about D/4 where D is the Airy diameter of said spots.

7. The system according to Claim 1 further comprising a condenser for providing said return light and an objective for focusing said spots, thereby providing a microscope for viewing or construction of an image of said section.

8. The system according to Claim 1 further comprising a scanner in the path of said light for said spots with respect to said section.

9. The system according to Claim 8 wherein said scanner is an X-Y scanner, where X and Y are orthogonal directions along said section, an objective focussing said light at said spots, and said polarization separator, polarization retarder and objective being movable in a Z direction orthogonal to said X and Y directions.

10. The system according to Claim 8 wherein said scanner is in the path of said incident and return light.

11. The system according to Claim 10 further comprising a laser providing a beam of said light which is incident on said medium with polarization such that said beam is sheared in a direction traverse to said beam.

12. The system according to Claim 7 wherein said microscope is a confocal microscope having a splitter passing light received by said medium and deflecting said return light to said condenser, a confocal aperture said condenser focusing said return light at said confocal aperture.

13. The system according to Claim 1 wherein said polarization separator is a Wollaston prism or a Nomarski prism each having reflecting portions which have optical axis oriented in directions transverse to each other.

14. The system according to Claim 13 wherein said light received by said medium is provided as polarized light substantially linearly polarized along one of said optical axis.

15. The system according to Claim 14 wherein said polarization rotator is an optic providing a phase shift of substantially 90°.

16. The system of Claim 1 further comprising polarization responsive optics in the path of said return light for passing, for construction of said image, light having predetermined polarization.

17. The system of Claim 16 wherein said polarization responsive optics comprises a polarization beam splitter which transmits said light received by said medium and deflects said return light, which respectively have generally orthogonal polarizations.

18. The system of Claim 16 wherein said polarization responsive optics comprises a polarizer and analyzer for passing light with selectable elliptical polarization as the polarization parameter for construction of said image represented by selected optical activity.

19. The system of Claim 18 wherein said polarizer is a variable optical phase shifter such that said polarizer and analyzer provide an ellipsometer.

20. Scanning confocal microscope which comprises a laser providing an incident beam, a beam splitter, a scanner for scanning an image plane in a specimen section in generally orthogonal X-Y directions in said plane, a polarization separator which shears said beam into two beams along a direction transverse said incident beam, a polarization retarder providing said sheared beams each with an opposite sense of generally circular polarization, and an objective for focusing said sheared beam at spots spaced in said direction in said image plane, a confocal aperture, a photo detector behind said aperture, and optics for focusing return light deflected by said beam splitter at said aperture.

21. The microscope according to Claim 20 wherein said separator, rotator, and objective are movable together to in a Z direction, generally orthogonal to said X-Y directions thereby selecting different image planes of said specimen.

22. The microscope of Claim 21 wherein said separator is a Nomarski or Wollaston prism.

23. The microscope of Claim 21 wherein said beam splitter is a polarizing beam splitter.

24. The microscope of Claim 21 wherein said beam splitter is a non-polarizing beam splitter and further comprising ellipsometer optics between said beam splitter and said return light focusing optics.

25. An optical coherence imaging system which comprises a source providing light which is of low coherence, a beam splitter which directs the light from said source into a reference arm and a sample arm to an image plane in a specimen section, a scanner in each sample arm for scanning each specimen in generally orthogonal X-Y directions in said plane,

and also in said sample arm, a polarization separator which shears said light into two beams, a polarization retarder providing said sheared beams each with an opposite sense of generally circular polarization, an objective for focussing said two beams at spots spaced from each other in said image plane, a detection arm in to which light is directed by said beam splitter from said reference and sample arms, and means for providing images in response to interference of light in said detection arm.

26. The system according to Claim 25 wherein said separator, rotator and objective are movable together to in a Z direction, generally orthogonal to said X-Y directions thereby selecting different image planes of said specimen.

27. The microscope of Claim 25 wherein said separator is a Nomarski or Wollaston prism.

28. The microscope of Claim 25 wherein said beam splitter is a non-polarizing beam splitter.